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The Search for Petroleum-Free LEGO | Earth911.com

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The Search for Petroleum-Free LEGO

Gemma Alexander December 6, 2018

When people wax nostalgic about old-fashioned toys that could hold a child's interest for years instead of hours, one of the first examples they provide is LEGO. Those brightly colored little bricks are so versatile that they have inspired design books and art exhibits, and so sturdy that they can be passed down through generations. What's more, the company is based in Denmark, where workers are well protected and environmental laws are strict.

But those beloved bricks have one thing in common with the cheap, disposable toys that parents jokingly refer to as UPC (useless plastic crap). They are still made of plastic — 1.1 million tons of carbon dioxide emissions-worth each year are produced to make LEGO. That's something LEGO is working to change.

LEGO's 2030 Sustainability Commitment

Already known for its environmental practices, LEGO recently set a goal to use only sustainable materials in its packaging and in all of its products by 2030. For a company whose main product is a plastic brick, that's a very ambitious goal, because right now, a brickworthy sustainable plastic does not exist. The Italian company Bio-On makes LEGO-like bricks out of a polymer developed from bacteria. Their bricks are almost exactly like LEGOs, but they don't hold up over time the way that LEGO bricks do.

About 80 percent of the 75 billion LEGO elements (individual pieces) sold each year are made of petroleum-based acrylonitrile-butadiene-styrene, or ABS. LEGO has been making its bricks from ABS since the 1950s. That, together with uniform dimension standards, is the reason a child can mix their new LEGO kits with their parents' — or even grandparents' — childhood pieces.

The company is determined to make the switch to sustainable plastics without sacrificing that continuity. Whatever material replaces ABS must be able to do so seamlessly. They do not want customers to choose between "before" and "after" bricks.

Bioplastics

LEGO has committed approximately 1 billion kroner (approximately U.S. $152 million) and 100 additional staff to work on the renewable plastics challenge. It has already experimented with around 200 alternative materials, including recycled ABS plastic, which doesn't reliably produce the bright colors required by LEGO's standards.

Among the newer materials are PLA (polylactic acid), which is a biodegradable plastic made from corn or sugarcane. 3D printers often use it as an ABS alternative, but even PLA doesn't meet the performance standards for a LEGO brick.

Another potential alternative is ABL, a new plastic developed at Oak Ridge National Laboratory that uses the same acrylonitrile and butadiene as ABS, but replaces the petroleum-based styrene with plant-based lignin. ABL is not as rigid as ABS, though. That means bricks made of ABL could deform through repeated use and load-bearing.

Twelve years may not be enough time to find a sustainable, yet identical, replacement for ABS.

THE LEGO VESTAS WIND TURBINE KIT REFLECTS THE COMPANY'S COMMITMENT TO SUSTAINABILITY. LEGO HAS ACHIEVED ITS GOAL TO BALANCE 100 PERCENT OF ITS ENERGY WITH RENEWABLE SOURCES AND HAS INVESTED IN TWO WIND FARMS TO PRODUCE RENEWABLE ENERGY. PHOTO: LEGO

Plants from Plastics

While the search for plant-based plastics continues, LEGO is doing what it can with what it has. Polyethylene is a readily available bioplastic made from sugarcane husks. The material is too soft for the company's toy blocks. But LEGO uses 19 other plastics to make its non-brick elements. Flexible polyethylene is suitable for elements like dragon wings, palm trees, and fishing rods. The company is already incorporating the material into its highly automated production systems.

Available for purchase directly from LEGO stores and on shop.LEGO.com beginning on November 23, the Vestas Wind Turbine is the latest LEGO Creator Expert kit and the first Plants from Plants release. The 826-piece model stands just over 3 feet tall. It includes pieces for a house with a furnished patio, a working porch light, and powered wind turbine, as well as three worker mini-figures and a dog.

Two of these pieces — the spruce trees in the landscape — are made from plant-based polyethylene plastic.

THE TWO TREES FROM THE LEGO VESTAS WIND TURBINE SET ARE MADE FROM PLANT-BASED PLASTIC. PHOTO: LEGO

That's still a small victory in a big challenge. But the kit also serves a psychological purpose. It is a reminder of LEGO's commitment to sustainability as well as its past success. But soon, LEGO will use polyethylene in one percent to two percent of its elements representing up to 1.5 billion pieces annually.

It is no coincidence that LEGO's first sustainable plastic elements appear in a wind turbine kit. LEGO achieved its 100 percent renewable energy manufacturing goal three years ahead of schedule by investing in wind power.

Feature image: LEGO botanical elements made from plant-based plastic sourced from sugarcane. Photo courtesy of LEGO

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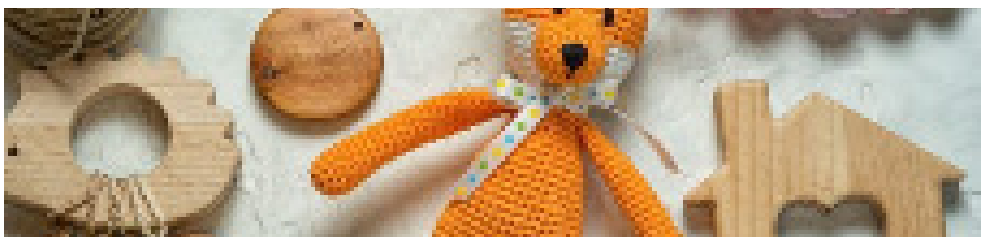

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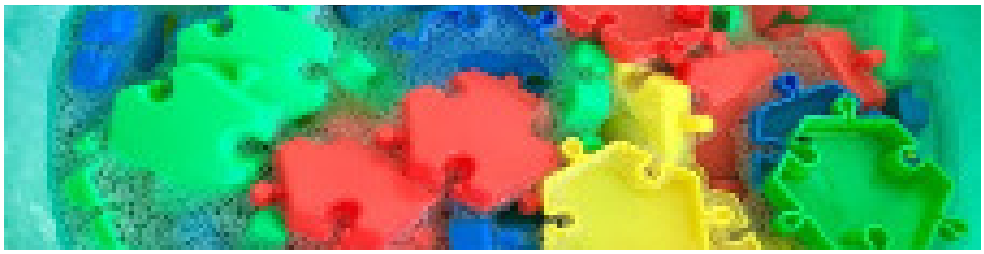

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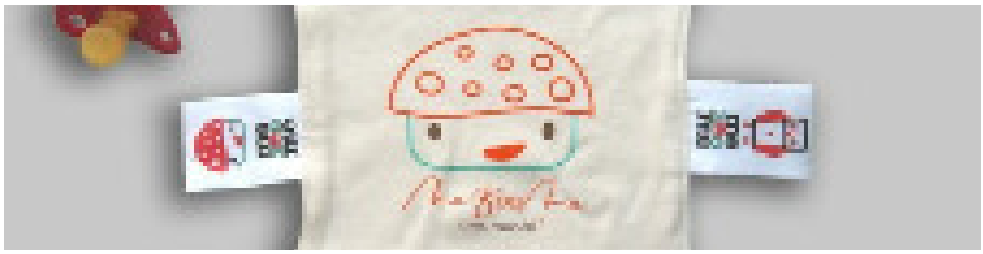

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Gemma Alexander has an M.S. in urban horticulture and a backyard filled with native plants. After working in a genetics laboratory and at a landfill, she now writes about the environment, the arts and family. See more of her writing here.